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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/982,846	10/22/2001	Atsushi Koike	839.449	8378

5514 7590 09/23/2003

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EXAMINER
KIELIN, ERIK J

ART UNIT	PAPER NUMBER
2813	

DATE MAILED: 09/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/982,846	KOIKE ET AL.
	Examiner	Art Unit
	Erik Kielin	2813

-- The MAILING DATE of this communication appears on th cover she t with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 June 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) *5-8* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *23 June 2003* is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

This action responds to the Amendments filed 20 March 2003 (Paper no. 9) and 23 June 2003 (Paper no. 12) and the drawing changes (Paper no. 11).

Drawings

The proposed drawing corrections filed 23 June 2003 in Paper no. 11 have been approved.

INFORMATION ON HOW TO EFFECT DRAWING CHANGES

Replacement Drawing Sheets

Drawing changes must be made by presenting replacement figures which incorporate the desired changes and which comply with 37 CFR 1.84. An explanation of the changes made must be presented either in the drawing amendments, or remarks, section of the amendment. Any replacement drawing sheet must be identified in the top margin as "Replacement Sheet" and include all of the figures appearing on the immediate prior version of the sheet, even though only one figure may be amended. The figure or figure number of the amended drawing(s) must not be labeled as "amended." If the changes to the drawing figure(s) are not accepted by the examiner, applicant will be notified of any required corrective action in the next Office action. No further drawing submission will be required, unless applicant is notified.

Identifying indicia, if provided, should include the title of the invention, inventor's name, and application number, or docket number (if any) if an application number has not been assigned to the application. If this information is provided, it must be placed on the front of each sheet and centered within the top margin.

Annotated Drawing Sheets

A marked-up copy of any amended drawing figure, including annotations indicating the changes made, may be submitted or required by the examiner. The annotated drawing sheets must be clearly labeled as "Annotated Marked-up Drawings" and accompany the replacement sheets.

Timing of Corrections

Applicant is required to submit acceptable corrected drawings within the time period set in the Office action. See 37 CFR 1.85(a). Failure to take corrective action within the set period will result in ABANDONMENT of the application.

If corrected drawings are required in a Notice of Allowability (PTOL-37), the new drawings MUST be filed within the THREE MONTH shortened statutory period set for reply in the "Notice of Allowability." Extensions of time may NOT be obtained under the provisions of 37 CFR 1.136 for filing the corrected drawings after the mailing of a Notice of Allowability.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-4 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,488,995 B1 (**Nishimoto** et al.) in view of US 5,472,508 (**Saxena**).

Regarding claims 1 and 9, **Nishimoto** discloses a film-forming method for forming a deposited film on a substrate arranged in a substantially enclosed film-forming vessel (Fig. 2) by means of plasma CVD, said film-forming vessel being provided with a raw material gas introduction means **203, 204** and an exhaustion means, said film-forming method comprising the steps of

introducing a raw material gas comprising at least a hydrogen gas and a silicon-containing raw material gas into said film-forming vessel through said raw material gas introduction means (Fig. 23),

maintaining an inner pressure of said film-forming at a desired value by means of said exhaustion means (labeled "V.P." for vacuum pump; Fig. 23); and

introducing a high frequency power into said film-forming vessel through a discharge electrode **206** provided in said film-forming vessel to generate a plasma in a plasma generation region between said substrate **201** and said discharge electrode **206** in said film-forming vessel, thereby forming said deposited film on said substrate maintained at a desired temperature using heater **202**,

characterized in that the formation of said deposited film on said substrate is performed while applying a periodicity voltage (RF voltage at 13.56 MHz) having at least two different waveform components having a different amplitude to an auxiliary electrode **208** arranged at a position in said plasma generation region of said film-forming vessel. (See also **Nishimoto** col. 10, lines 6-19; col. 11, line 56 to col. 12, line 16. See also, the examples in cols. 14-20.)

Nishimoto does not teach repetitive application of the waveform or more specifically that the periodicity voltage has (i) a waveform component having an amplitude capable of generating mainly a radical of a silicon-containing compound and (ii) a waveform component having an amplitude capable of forming mainly a radical of hydrogen --as further limited by instant claim 2.

Saxena teaches a CVD method wherein a voltage is applied to auxiliary electrode **6**, **8**, having a pulse height (amplitude), pulse width, and pulse **repetition** appropriate for forming radicals of each species being deposited. (Abstract; col. 4, lines 17-38; col. 5, lines 31-45.)

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use separate waveform components appropriate for forming Si radicals and for forming H radicals, as taught by **Saxena**, in the method of **Nishimoto**, in order to aid the dissociation of the

reactive silicon gas and the hydrogen gas, as taught by **Saxena,** and thereby increase the deposition rate.

Regarding claim 3, **Nishimoto** discloses the auxiliary electrode **208** is arranged such that said auxiliary electrode is opposed to a film-forming surface of the substrate and is situated at a position between the substrate and the "discharge electrode." (See Fig. 2.)

Regarding claim 4, **Nishimoto** discloses the auxiliary electrode **208** is arranged to be in parallel to the substrate and perpendicular to a flowing direction of the raw material gas which flows from the raw material introduction mean toward the exhaustion means in the film-forming vessel. (See Fig. 2.)

3. Claim **9** is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,348,238 B1 (**Mizuno** et al.) in view of US 3,757,733 (**Reinberg**).

Mizuno discloses a film-forming method for forming a deposited film on a substrate arranged in a substantially enclosed film-forming vessel **1** by means of plasma CVD, said film-forming vessel being provided with a raw material gas introduction means **3** (Fig. 5) and an exhaustion means **11**, said film-forming method comprising the steps of

introducing a raw material gas into said film-forming vessel through said raw material gas introduction means **3** (col. 18, lines 23-54);

maintaining an inner pressure of said film-forming at a desired value by means of said exhaustion means (col. 6, lines 50-51; col. 17, lines 23-26); and

introducing a high frequency power into said film-forming vessel through a discharge electrode **4** (col. 6, line 56) provided in said film-forming vessel **1** to generate a plasma in a

plasma generation region between said substrate and said discharge electrode in said film-forming vessel, thereby forming said deposited film on said substrate maintained at a desired temperature (col. 6, line 56);

characterized in that the formation of said deposited film on said substrate is performed while applying a periodicity voltage having at least two different waveform components having a different amplitude to an auxiliary electrode arranged on a side opposite a film-forming, face of said substrate in said film-forming vessel (Figs. 6(1)-6(2); col. 13, line 61 to col. 15, line 42).

Mizuno does not indicate that the raw material gas includes a hydrogen gas and a silicon-containing raw material gas, but does indicate that the plasma treatment method is appropriate for chemical vapor deposition, CVD (col. 18, lines 23-54 --especially lines 27-32).

Reinberg discloses that it is known to use plasma CVD to deposit high quality silicon-containing films using a mixture of a silicon-containing gas and at least a hydrogen (col. 1, lines 19-22).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use silicon and hydrogen as the raw material gases as taught by **Reinberg**, using the method of **Mizuno**, because **Mizuno** teaches that the method achieves the benefits for CVD film formation.

Response to Arguments

4. Applicant's arguments with respect to the rejection of claims 1, 3, 4, and 9 as anticipated by Nishimoto have been considered but are moot in view of the new ground(s) of rejection.

5. Applicant's arguments filed 20 March 2003 (Paper No. 9) have been fully considered but they are not persuasive.

Applicant argues on p. 14,

> "Saxena does not explicitly teach that a periodicity voltage having a waveform component having an amplitude capable of generating mainly a radical of a silicon-containing compound and a waveform component having an amplitude capable of forming mainly a radical of hydrogen is applied to the auxiliary electrode."

Examiner respectfully disagrees. Saxena specifically describes the precursor gases comprising silanes and hydrogen at col. 1, lines 25-46. The precursors are the "desired elements or compounds" as noted in the Abstract from which **radicals** are specifically produced by providing proper waveforms specific to each precursor. Hence Saxena explicitly teaches this. Accordingly, the argument in Applicant's response disregards the express teachings in Saxena. Moreover, Saxena is not required to teach this because Saxena teaches that the waveforms are to produce radicals from the "desired elements or compounds" which are the silanes and hydrogen of Nishimoto. Accordingly, Saxena provides additionally that a reasonable expectation of success exists since Saxena has applied the method specifically to the same compounds as used in Nishimoto for forming the same type film as in Nishimoto.

Applicant's arguments regarding Mizuno are noted. Examiner respectfully disagrees that the waveform components in Mizuno must be characterized as described by Applicant in the argument. In regard to claim scope, it has been held that "The name of the game is the claim." *In re Hiniker Co.*, 47 USPQ2d 1523, 1529 (Fed. Cir. 1998)." Claims are to be given their broadest reasonable interpretation unless specially defined in the specification. Applicant has not specially defined waveform away from its standard meaning. The waveform of Mizuno reads on the broadest reasonable interpretation of the claimed limitation.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 6,100,466 (**Nishimoto**) teaches a PECVD device similar to that in the **Nishimoto** reference applied above.

US 5,476,798 (**Guha**) teaches a PECVD method wherein a voltage is applied to an auxiliary electrode **60** in a plasma generation region **54**. (See Fig. 1.)

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erik Kielin whose telephone number is 703-306-5980. The examiner can normally be reached on 9:00 - 19:30 on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached at 703-308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Erik Kielin
Primary Examiner
September 11, 2003